Electronic Supplementary Information

Synthesis and Growth Mechanism of Monodispersed MoS_2 Sheets/Carbon Microspheres

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XPS data report:

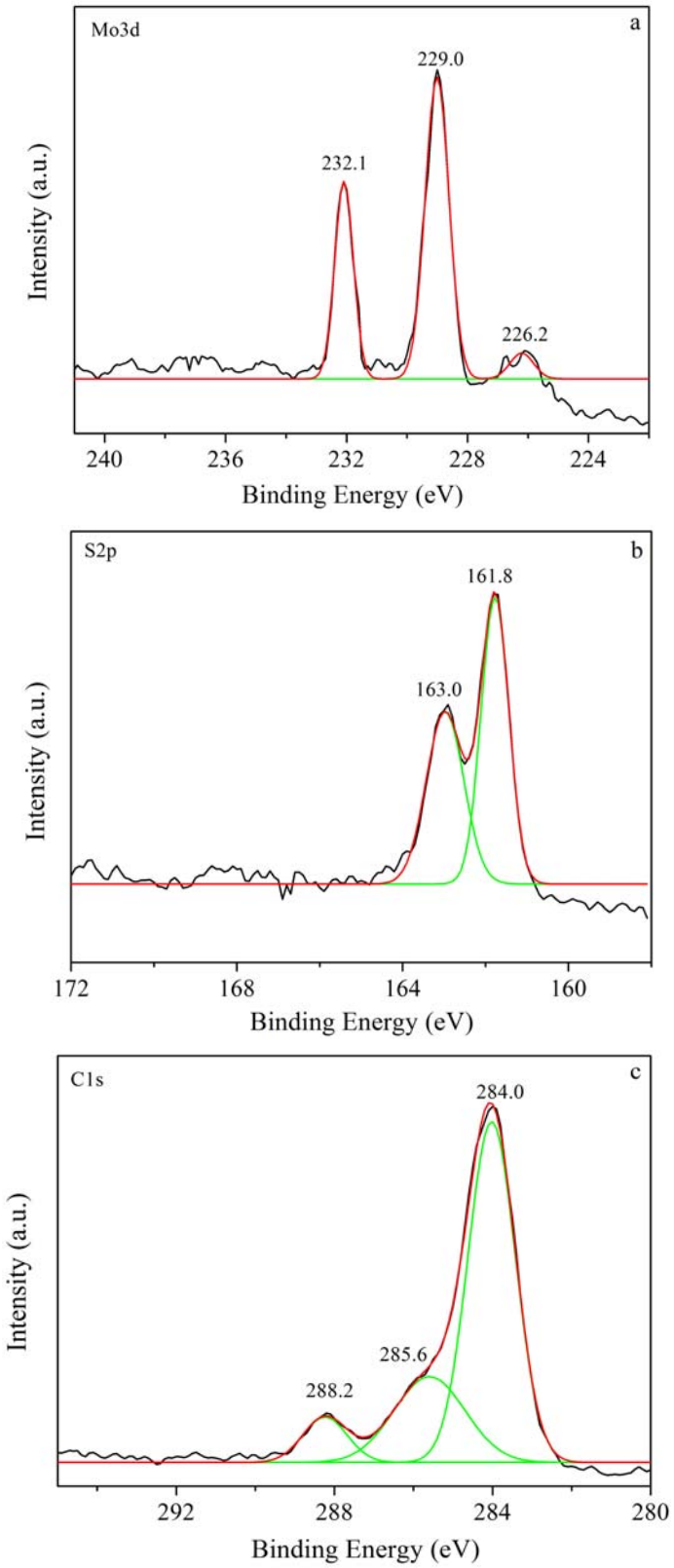

Fig. S1. XPS studies of the as-prepared sample at 400 °C: (a) high-resolution spectra for Mo 3d, (b) high-resolution spectra for S 2p, (c) high-resolution spectra for C 1s, before and after curve peak fitting.

XPS analysis has been carried out to identify the components and structures of the as-prepared sample at 400 °C. The Mo 3d, S 2p and C 1s XPS spectra for the as-prepared sample at 400 °C are presented in Fig. S1. The high resolution deconvoluted spectra in the region of binding energy for Mo 3d (displayed in Fig. S1a) shows three peaks positioned at 232.1, 229.0, and 226.2 eV corresponding to Mo and S species present in the sample. The first two peaks centered at 232.1 and 229.0 eV can be contributed by 3d doublet (i.e. 3d3/2 and 3d5/2 respectively) of the Mo(IV) species in MoS_2. The third peak at 226.2 eV can be ascribed to the 2s binding energy of S in MoS_2. The S 2p photoelectron peak of the sample in Fig. S1b depicts two distinct peaks after deconvolution. These peaks, which are centered at 163.0 and 161.8 eV, and represent the respective binding energies for 2p1/2 and 2p3/2 of S^{2-}, are consistent with those in MoS_2 [1-2]. Similarly, the C 1s photoelectron peak shown in Fig. S1c can be decomposed in three symmetrical peaks situated at 288.2, 285.6, and 284.0 eV. They are due to COOR, C-CO (or C-S) and C-C (or C_2H_2), respectively [3-4]. Compared with the XRD and Raman data, we deem that the product was consisted by MoS_2, carbon, and some organic functional groups exist in the carbon.

References:

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[2] K. C. Wong, X. Lu, J. Cotter, D. T. Eadie, P. C. Wong, K. A. R. Mitchell, Wear, 264 (2008) 526-534.

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[4] N. Freyer, G. Pirug, H. P. Bonzel, Surface Science, 125 (1983) 327-334.

TEM images and XRD spectrum:

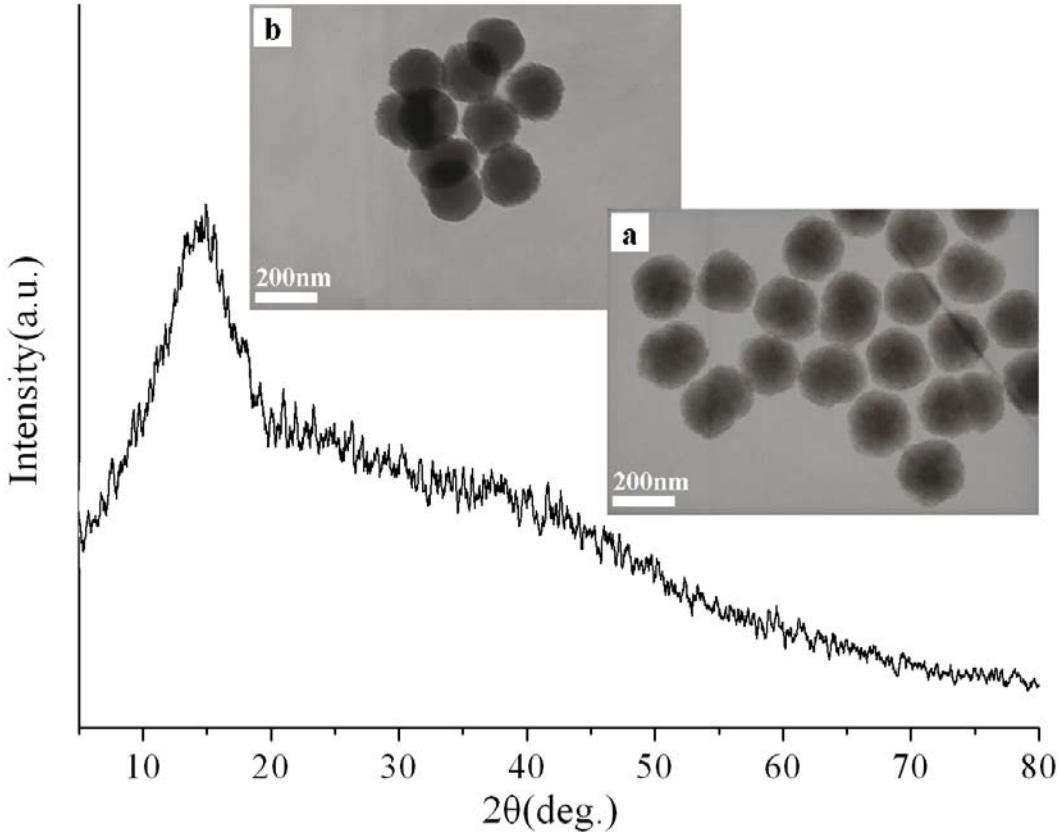

Fig. S2. XRD pattern of the sample synthesized at 100 °C and then washed with CS_2.

Inset a, b – TEM images of the sample before and after washing with CS_2.